ATPDRAW
Graphical Preprocessor to ATP
Version 5.7

ATPDraw is a graphical pre-processor to ATP and is used to create and edit circuit files. The output of ATPDraw is a file you can use as input to the ATP program. The program is developed by Dr. Hans Kr. Høidalen at SINTEF Energy Reseach/Norwegian University of Science and Technology in Norway, sponsored by Bonneville Power Administration, Portland-Oregon-USA. Multi-phase developments and Vector Graphics in the v5 version is sponsored the EEUG organization. The developers are not responsible for any erroneous results produced by ATPDraw. This 32-bit Windows program runs under MS-Windows 9x/NT/2000/XP/Vista/Windows7.

Version 5 was released in September 2006. The version is substantially updated and some core features are modified. A new project file format is introduced to allow larger components and update to the pkzip 2 compression standard. Multi-phase nodes and Models inputs/outputs (1..26) is implemented and Vector Graphics is for the first time introduced. Integrated editable Models were also included. Version 5.3 was upgraded to the new compiler Delphi 2007 Win32. The entire design is upgraded to get a true Windows XP/Vista look and feel. The help file system is also upgraded significantly and now follows the HTML help standard preferred in Windows Vista. Version 5.4 included a new Output Manager that required a new project file format. Several extensions and improvements were added to patches in version 5.4, so a new version 5.5 was created and this version also supports better handling of Groups. Version 5.6 improves significantly the Hybrid Transformer model and introduces circuit variable optimization. Version 5.7 includes improved and embedded Windsyn, new GUI features, an important new TFORTRAN component, multi-phase components, and a new rich text editor.

Updates in version 5.7 are:

- Direct implementation and improvement of Windsyn machine modeling. ATPDraw does the parameter fitting internally, offering higher accuracy and user control as well. Problems with decimal points and non-updating values are gone. The new induction machine model comes with a new fitting module that gives the user control of fitting parameters, including slip and maximum torque. It also has a plotting function for Torque/speed characteristics. The synchronous machine comes with an exciter control for voltage or reactive power. Both models also have a governor speed controller. The user can easily switch between various starting conditions.
- GUI features. There is a new 'center circuit' button. The circuit world size can be changed in the View window. The user can add lines, arrows, rectangles, ellipses, and pictures to the circuit (Tools|Drawing). There is a brand new side bar with tree-view quick access to the Component Selection menu, as well as a Simulate page with the most important ATP settings listed.
- New components. Two new TACS sources: Constant and Models input. More important is that a new general fortran component called TFORTRAN has been added. With this the user can specify 1-9 inputs and 0-9 data and write the fortran code on the form OUT= ($I1-$I2)/$D1 etc. where $In are the inputs and $Dn are the data, automatically inserted by ATPDraw when creating the file. In this way the fortran statement becomes transparent and can be copied or grouped without loss of consistency.
- New properties of nodes and components. An n-phase node can be short circuited to a single phase node, and a component can be of type Multi-phase. A few components have this property implemented (rlc, nonlinear elements, diode, tacs source), but this will be extended in the future. The phase offset is now also generalized for multi-phase connections; a three-phase connection can be connected at a six-phase node starting at phase D.
- A new Help and Text editor. Syntax highlights are available for Models and Help files can be RTF files (1.0) with different fonts, styles, bullets and colors.
- Hybrid transformer: A shell-form type B added. Help file updated.
- Important bug-fixes: Compress+Cancel resulted in node naming problems as reference to the (cancelled) group was not removed. In previous version node overlap and equal node naming could happen with hidden and disabled nodes.

Updates in version 5.6 are:

- Hybrid Transformer: Final slope for magnetization characteristics added (Core|Settings). New, better and faster optimization routine for the Frolich equation parameters added (Gradient based method). Core loss topology fixed; resistors and nonlinear inductors in parallel, new fitting of core loss resistances. Support of type 96 added. Correction to single point excitation test report (linear core) and shell-form cores.
- $Parameters: Intermediate variables ($$) used to allow nesting. Special loop syntax added (@[a b], @FILE, @LIN, @LOG, @POW, @EXP).
- New cost function model WRITEMAXMIN added. Writes single value to lis file and reads back after simulation. Supports multiple runs (PCVP) and includes a View module.
- Optimization: Optimization circuit variables with Gradient Method, Genetic Algorithm, or Simplex Annealing routines. Communicates with cost function and circuit variables.
- Load flow components added together with a new page on ATP|Settings.
- Two new examples added: Universal machine control, Resonance earth coil tuning. Wind generator controls by Piergiovanni LaSeta added as exa_19.acp.
- Increase from 21 to 24 phases in the LCC module.
- BCTRAN external saturation characteristics recovered (not stored in version 5.4-5.5).
- Windsyn component TACS part recognized. Use the WindSyn_ATPDraw.exe version of Windsyn.
- Connections inherit Phase property.
- Zooming in View nonlinear dialog (drag rectangle, right click to restore).
- External characteristic in Groups fixed.
- New AC source with rms and line-line scaling. 1&3 phases, grounded/ungrounded.
- RLC PHASOR component.
- Updated Help file system and new User's Manual.

Updates in version 5.5 are:

- Visual feedback in Compress: The content is redrawn in the middle of the circuit window alone. The external nodes are drawn enclosed by a red ring. When the user selects a component in the list it is drawn in a lime color on screen. This is also the case when nodes are selected in the Available list. The already external data/node of the selected component is written with a lime color in the Added to lists. When the user selects a data/node in the Available lists that already is external this is highlighted in the Added to lists.
- UNDO for Recompress added.
- When Extract is selected the group should now always be visible in the middle of the circuit window.
- A bug in earlier versions restricted the number of groups effectively to 255 in a circuit. This was only partly fixed in version 5.4 and now for new groups (Compress).
- A new checkbox added to the Output Manager to force a more primitive drawing of the On-buttons for statistical studies, as this might fail on some windows systems.
- Drag and drop feature for project files from Windows File Manager to ATPDraw. Drag the file to the circuit window to Import and the Header of background to Load.

Updates in version 5.4 are:

- The project file format is changed. Older ATPDraw versions can not read version 5.4 files.
- Vector graphic editor significantly enhanced.
- Possible to add a standard bitmap background to component icons, including scaling and rotation.
- Output Manager (F9). ATPDraw lists all output requests and gives the user direct access to each of them. Includes also a statistical tabulation option with scaling and grouping.
- Additional cards moved to separate new component under User specified in the selection menu. Follows standard edit operations including Hide and Sort. Inclusion of request templates via the built-in text editor's context menu (right click).
- Models Record moved locally into each model component.
- All results files stored in memory (also for LCC and BCTRAN). $Include files dumped to the result directory (user selectable ATP or project folder) each time the final ATP file is created. No more any risk of file sharing conflicts with simultaneously open projects. No initial request for ResultDir.

BCTRAN result file stored in project.
- User extendable Selection menu. Add frequent used sub-circuits to the selection menu. Set Plugins directory under Tools|Options/Files&Folders.
- Protection of Groups, Models and User Specified components. Password, $LISTOFF, and random file dump.
- Hybrid Transformer model benchmarked and corrected.
- Windsyn integration supported. New Windsyn version required.
- As usual several small bugs are corrected in the new version. For instance wrong display when the number of compressed groups was larger than 255.
- Updated help file.
- Read-only project file problem. No feedback was given to the user in this case.
- Nonlinear inductances with initial conditions, still challenges for delta-couplings.
- Fixed LCC Verify '.dat' used as extension.
- New Type-94 components
- Now also metafiles as picture background (only bitmaps are rotatable)
- Example files Exa_4 had wrong phase sequence

Updates in version 5.3 are:
- Upgrade to Borland Delphi 2007 compiler.
- Themed layout. True Windows XP/Vista appearance.
- New and updated help file system (F1) in HTML style. ATPDraw.chm replaces the old files ATPDraw.hlp+ATPDraw.cnt.
- New main menu and toolbar styles. XP look&feel, better enabling of available items, new icons. ATP sub-menu extended and reorganized. A new Plot command (assign in Tools|Options/Preferences) added and a sub-process item that includes the three individual steps of the 'run ATP' command. Possible to customize the Toolbar at runtime (stored in %APPDATA%\ATPDraw\Toolbar.cfg).
- Multi-lined circuit text with font and color options. Right click on circuit text. Earlier versions of ATPDraw can not draw the multi-lined texts correctly.
- Connections options modified. Node dot 1/2 will force the node dots on regardless of the setting of the Toolbar node size. Relation added as a property. The Relation (no connection, just visualization of information flow) is drawn in dotted style.
- Improvements in the Hybrid Transformer XFMR module. Triplex cores supported (3 single phase cores). Fix of scaling problem for D-couplings and the establishment of a piecewise characteristic for low-voltage transformers. Core-losses in the yokes modeled somewhat different. Frequency dependent winding resistor fitting modified to minimize the imaginary part.
- Vector graphic editor significantly extended. Graphical editor with mouse support and dynamically drawing of shapes and texts. Support of pie shapes and rotated ellipses and rectangles.
- Right mouse click in circuit window improvements. Works also for node names, labels, and text. Alt+left click to select texts.
- Copy nonlinear characteristic fixed.
- Linux text compatibility problem (introduced with version 5.0 -> black text shadow) fixed.
- Once again possible to specify the node names directly in the Component dialog. A red node name is user specified.
- Nodes set as unconnected also in the case of hidden connections and components (used for TACS and Type 94).
- Improved LCC dialog with better support of Cancel and a new page Nodes where node names and conductor number can be assigned.
- Version 5.2 was prepared for the EEUG short course in Sept. 2007 and introduced a more modern toolbar/main menu style. When upgrading to the new compiler Delphi 2007 this development was replaced by the entire new menu styles offered there.

Updates in version 5.1 are:
- The integrated editing of MODELS has been improved in several steps. Now the icon should only

change if the number of inputs or outputs is changed.

- Models, LCC, and User Specified components with the same name are handled differently. Now ATPDraw copies the edited data over to all components of the same type with the same name. The user can make components independent by giving them unique names (Models:Model header, grayed field in component dialog, LCC: Run ATP click requests the name, shown in header, User Specified: $Include field in component dialog).
- BCTRAN uses an intermediate punch file on disk. A time stamp test is now added to this file to force a new ATP execution if the file is too old.
- The option to change the icon and add individual help text is added to the LCC, BCTRAN, and XFMR components.
- The ATPDraw ini-file is now written to the %APPDATA%\ATPDraw directory (documents and settings/user/application data /atpdraw). This will make it easier for several users to run ATPDraw from a common server.
- In the LCC objects the length is optionally added to the icon (Library|Synchronize required to update old circuits).
- A bug related to saturable transformer components in the case of "external" magnetizing characteristics where $INCLUDE erroneously were inserted is fixed (the extended component size of 64 data should make such external characteristic unnecessary).
- A new (genetic) optimization algorithm used in the process of fitting foster equivalent parameters in the frequency dependent winding resistances for the XFMR component. The procedure is a bit slower but more reliable.

Updates in version 5.0 are:

- New handling of Connections. Connection between n-phase and single phase. Phase, color, and label properties. This can replace the usage of Splitters. Transposition will only take place through a 3-phase connection. Possible to click on a connection's midpoint to draw a new connection with inherited properties. Click and hold required to select a connection.
- Vector graphics. Better zooming capabilities, larger icons, dynamic icons (RLC, LCC, transformers, sources etc.), flipping. A vector icon can have the size of 255x255 pixels (compared to the 41x41 for bitmaps). Combination of bitmaps and vector graphics supported and backward compatibility is ensured. An icon can consist of maximum 93 elements (lines, rectangles, ellipses, polylines, polygons, circle arcs, bezier curves and text in 256 colors in all pen and brush stiles). Multiple layers are supported that can be turned on/off dependent on user selection of data.
- New file handling concept. A Sup-file is used only when a component is created and it does not follow the project any more (all their properties are inherited). Components with "external data" (Models, User specified, LCC, BCTRAN, XFMR, etc.) are no longer associated with a file on disk. All data are individual (components do not share data any more) and stored in memory. The message *"File on disk is older than file stored in project. Replace?*" will not appear any more. The idea is to make a clear distinction between files in an external, user managed library (the user is allowed to export to and import from this library) and data used in the project and to avoid any conflicts between two simultaneously open projects. All results from a project (ATP-file, $Include files) are supposed to be stored in a Result Directory that the user must specify for each project. The project file format is updated and now follows the pkzip 2 standard using the *inflate* compression method (old ATPDraw versions can not read the new project files).
- Increased component size: Up to 26 phases (Model variables X[1..26]), 64 data, and 32 nodes. 21 phases in the LCC module.
- Models more integrated in ATPDraw. Models are handled completely in memory without using external files (except for original mod/sup-file in the external library). The user can edit the Model description (mod-file) directly inside each Model component. Changes done in the Model's header; input, output, and data are immediately reflected in the component dialog and the icon. Vector graphics used as default for Models. Indexed data d[1..number] supported.
- New support and project file formats, backward compatibility ensured (but not farward).
- Variable names (useful for Models) and labels increased to 12 characters.

- A Unit string added to data parameters with special support of XOPT/COPT.
- CompileCircuit is rewritten to remove the Splitter back-to-back problem and to support the enhanced connection.
- MakeATPFile rewritten for better handling of $Parameters (also for MODELS).
- Recompress. Modify the interface of a group component. Select a Group then Edit|Compress. Select node position 0 to enter positions off the old border.
- The probes are enhanced to support more than 3 phases and an (preliminary) option to read the lis-file and display steady state values is added. A Models probe added to monitor global MODELS variables.
- The node dialog changed and combo boxes added for selection of TACS node signs (the color of the connection changed), Models input types, and machine control setting.
- The vector icons are individually scalable (select the icon and move the mouse cursor to the border).
- Flipping of icons added (left-to-right).
- Ground symbol rotation added.
- All standard icons are described by vectors (~200 icons!). Backward compatibility required that size and node positions were maintained.
- Dynamic changes in the icons for RLC branches, sources, a time controlled switch, transformers (coupling indication), electrical machines, statistical/systematic switches, TACS transfer functions and devices, and LCC.
- The nodes position is described by a relative distance to the components center rather than a position on the icon border. This enables more than 12 nodes.
- Black node No name given, Red node= user name given (just the opposite as previously), (Blue node (negative TACS input) no longer supported).
- A type 1 source is added (up to 10).
- TACS Fortran statements for trigonometric, exponential, and logarithmic functions added. RAD, DEG, and RND functions added.
- Rubber-band connection gridsnap problem corrected.
- Several problems related to zooming corrected.
- The runtime error 103 problem solved by executing ATP as a process under ATPDraw. The multiple BCTRAN transformer problem fixed.
- The XFMR model fixed so that the core can be related to any winding. Previously the low-voltage winding had to be the inner winding. Saturable Transformer zigzag node naming corrected.
- The user can add individual help text to all components. This can be accomplished in two ways: 1) Enter Edit definitions (change icon, help, node, and data locally) and specify a text in the help editor. 2) Specify a file with the name ComponentName.txt (for example RESISTOR.txt) in the /HLP directory. This help file is common to all components with the name ComponentName. When *Help* is clicked in the Component dialog the standard help text (for standard components) is written first followed by the individual help and the external help file. When a component is copied the individual help is copied with it.
- UnDo/ReDo is updated. Possible to undo “external” data editing.

Updates in version 4.2 are:

- The advanced Hybrid Transformer model added. Transformer data of leakage inductance, frequency dep. winding resistance, capacitances and topologically correct core magnetization and losses based on Design, Test report, or Typical values. Autotransformers and all Y- and D- couplings supported. More information is added to the ATPDraw.hlp file.
- A node naming problem in circuits where the number of (ATPDraw) nodes exceeded 10.000 corrected. Now, up to 29.999 circuit nodes with node names provided ATPDraw are allowed. The first 9999 starts with the letter 'X', then from 10.000 to 19.999 with 'Y', and finally from 20.000 to 29.999 with 'Z'. This also means that the user should avoid giving nodes names starting by these letters followed by a four digits number.
- The module that read mod-files and create sup-files had a problem with variables containing the keywords INPUT, OUTPUT, VAR, and DATA. For example would an input with the name 'idata' be interpreted as the beginning of a DATA section and the following inputs thus misinterpreted as data.

This problem is now corrected. At the same time the restriction of a model header of maximum 255 test lines (excluding blanks and comments) is removed.

Updates in ATPDraw 4.1 are:

- A new component TSWITCH with the RECLOSE option added to *Switches*|*Switch time controlled*. The user can choose a single or a three phase switch with equal operation times for all phases.
- Transmission lines with lumped parameters (type 1,2 .. and 51, 52 ..) have got a 'length' parameter. The length is set to unity for older projects. The distributed parameter transmission lines have got a new layout with a direct, visual support of the ILINE and IPUNCH flags.
- Text labels are editable as other objects. They can be selected as a part of a group and copied (but not rotated). Holding down the Ctrl key in the selection process gives priority to the text labels.
- BCTRAN. Several BCTRAN components can now share the same data file. This allows a true support of copy/paste. In previous versions the user had to save the data file (*.bct) with a different name for each components even if they were equal.
- MODELS. A node naming problem in the INPUT section fixed. If several models were connected to a splitter and with more tham one input from the same node (for instance current and voltage) a node naming conflict appeared.
- LineCheck module. Xopt and Copt written to the ATP file. In earlier versions a node name starting with the letter 'C' was actually treated as a comment. This resulted in an 'Unexpected file name encountered..' error message.
- LCC verify. Two problems with lack of DOS-compatible paths corrected.
- The Auto-detect LIS-file errors and frequency scan output flags (ATP|Settings) stored in the project.

Updates in ATPDraw 4.0 are:

- A new component SATTRAFO (saturable 3-phase transformer) replaces the old GENTRAFO. This component supports all phase shifts for D and Y-couplings as well as Auto transformers and zigzag-couplings with phase shifts <-60,0> and <0,60> degrees. Older version of ATPDraw can not read project files created by version 4.0 if SATTRAFO is used.
- The TACS nodes have a new color code. Positive input (type 1) and output (type 0) black/red as before. Negative input (type 2) blue color. Not in use (type 3) background color. Even if the node seems to vanish for type 3 specifications it is still possible to click on it.

Updates in ATPDraw 3.9 are:

- The grid snap feature was wrong for some group operations causing the connections to be out of position.
- The /INITIAL card is written to the ATP file only when required. An empty such card (followed by /OUTPUT) resulted in problems in Harmonic Frequency Scan for some ATP versions. Similarly, the BLANK INITIAL card is only written when required.
- A wrong column format was written to the ATP file for frequency dependent RLC branches.
- The Line/Cable object (LCC) had an error for Cable Constant when calculating the NGRND parameter for JMarti models and enclosing pipe cables.
- The comments for LCC components are written to the ATP-file. Labels and the Hide features are also included for lines and cables.
- The Group No input for all objects have changed name to Order to become more in line with the actual meaning (criterion for ATP file sorting). Order also added to LCC objects.
- Semlyen models supported in Cable Constants.
- An overwrite file warning added.
- The Hi and Lo limits visualized in the Transfer Function dialog box.
- Lock circuit option added in *View*|*Options*. When checked objects can not be selected and connections not drawn Useful for computer exercise situations.
- Open project warning. When opening a project ATPDraw extract the content to the disk (sup, lib, alc, bct). If files with equal name but different dates are already stored on the disk, ATPDraw gives a warning message and lets the user choose which file to keep. Earlier versions gave priority to the

newer of the two files. Version 3.9, on the other hand, gives priority to the files stored in the project. If the user replies *YesToAll* the project files will always overwrite the files on disk. This is normally fine, but the user should be aware of the situation when working on two projects simultaneously both using the same files.

- KIZILCAY F-DEPENDENT and HYSTERESIS HEVIA components added which originators both were elected as honorary members at the EEUG meeting in Graz, Dec. 2003.
- Nonlinear resistance type 91 and 92 added
- Find Node name option added. ATP|Find Node
- Grid snap problem in copied groups corrected. The problem appeared when components in sub-groups where moved. All circuits are grid snap corrected when loading.
- Serious bug identified in the zip-module that would result in 'Incompatible file format' when the number of Texts, Variables and FreeFormats exceeded 35, 116, or 123 respectively. Due to a too small buffer the circuit file (*.$$$) was not written to the project.
- It is now possible to specify up to 5 rotor coils for universal machines 1, 3, 6, and 8, when the saturation is turned off.
- 3-phase nodes of Models supported. 3-phase inputs/outputs must be declared by indexed variables [1..3].

Updates in ATPDraw 3.8 are:

- The number of phases editable in the LCC dialog box (the user do not have to select the number of phases first).
- Initial version of **Line Check** module. Select a line/cable group in the circuit window (several objects allowed). Then click *ATP*|*Line Check*.
- Possible to edit node names, labels and **free text** directly on the screen. Select Edit|Edit label to place a free text in open space.
- ATPDraw draw gives a warning when creating the node names (Run ATP, Make names) when **components overlap**. Completely overlapping connections are automatically deleted. After this process overlapping components can be selected as a group in *Edit*|*Select*|*Overlap obj*.
- Small value corrections:
  - Earlier for example 4.97E-5 in the new TACS transfer functions was written to the ATP-file as 0.0000 instead of the correct 5.0E-5.
  - Small values (typical 3.23E-5) for all objects was written with too little precision (.00003 instead of 3.2E-5).
- The voltage for single phase BCTRAN transformers now devided by sqrt(3).
- The file extension *.dat for ATP-files is supported in the built-in text editor.

Updates in version 3.7 are:

This version is a further development of the Delphi 6.0 version.

New features:

- Better support of multi-sectional cable constant pi-model. Cross bonding and non-homogeneous models supported.
- Radio buttons replace the U/I-code for all sources.
- TACS device 55 (digitizer) included.
- GIFU switches (Valve and TACS switch) supported and a new example file Exa_13.adp included.
- The View module for nonlinear characteristics is improved. The values are scaled to ensure a sufficient resolution.

Bug corrections:

- The elimination of the Mutual button in Line/Cable verify introduced in 3.5p5 resulted in a run-time error the second time verify (LMFS) was selected.
- Improved handling of $UNITS, -1, -1 cards for PI-models under line/cable modelling.
- Hiding a group object resulted in a pointer error and program crash.
- Transposition objects failed in large circuits. Fixed in patch 4.
- The new nonlinear inductance components with initial conditions improved.

- BCTRAN Triplex core fixed for three phase cases.
- The new capacitor component CAP_RS failed when a parameter was specified for the capacitance rather than a value. Still it is not possible to combine an $Parameter specification with an automatic damping resistor, simply because the capacitance value is unknown to the component.
- UM machines 6&8 failed due to true blank lines in the ATP-file in combination with sorting by cards (ATP version dependent problem?). Zeros added instead for the stator coils.
- Type 94 branch output request stored in project file.
- The BRANCH-request removed from LMFS data cases (Line/Cable Verify) (PI-models).
- This card in not needed and resulted in a runtime error with newer ATP versions.

Updates in version 3.6 are:

This version is similar to version 3.5 and came in 5 patches equal to 3.5p7-3.5p11 respectively. The only difference is that version 3.6 is compiled under Delphi 6.0 and is thus more compatible with Windows XP.

Updates in version 3.5 are:

- Support of BCTRAN 2-3 windings, 1/3 phases, external or linear saturation. Patch 11 needed (or version 3.6p5). Several bugs corrected during development.
- Bug in universal machine node naming corrected. D-connection corrected.
- Bug in group copy/paste between circuits is fixed.
- Standler and Cigre sourced introduced.
- Initial UM conditions for rotor currents fixed.
- The UM help files are updated to give information on the inductance units.
- The ATPDraw help file is slightly updated.
- An erased ground symbol is no longer drawn when editing nodes.
- The node naming warnings Same name on different nodes and Duplicate name of node appear once for each event.
- Drag icon on/off works in *View|Options*
- Circuit fonts user selectable in *View|Set circuit font*
- Buttons for sorting line constants cards are added to the LCC dialog box.
- The Delete button in the Characteristic page is fixed to avoid the never ending "Illegal numeric specification!" message when the first data point is deleted.
- The Mutual Seq. button under Line Model Frequency Scan is removed when the line/cable has less than 6 phases. This resulted in a new bug fixed in version 3.7.
- ATP now runs much faster under the LCC and BCTRAN windows. Instead of checking the process status continuously this is done only every second.
- Two new type 15 sources, STANDLER and CIGRE are added to the standard library.
- It is possible to customize the icon for the LCC components (Edit icon at the bottom of the LCC dialog box).
- The node handling in LCC objects was wrong in patch 5 and 6. In some cases 5-character 3-phase names was written in the $Include call.
- Copying of group objects is fixed. When copying a group to another circuit and closing down the original circuit, the support file for the objects was unintentionally removed.
- The delete temporary file option, awkwardly introduced in patch 2-3 and available as optional later is completely removed. The option is anyway dangerous when sevral instances of ATPDraw is launched. It is now up to the user to tidy up the directories. Still, all required files are stored in the projects, so deletion should be safe.
- the format error (missing period) when ATPDraw created to ATP-file is fixed. This error has been present for a long time. Example 12345.678 was written 12345 instead of 12345.
- Pocket Calculator placed after the /REQUEST card at the end of the ATP-file.
- Transposition error corrected. Circular transpositions allowed if the phase sequence is correct.
- An error in ATPDraw.scl related to the LCC_6.sup object corrected (Kind for nodes should reflect the circuit number).
- The *ATP|Settings/Additional* page is handled correctly when switching between circuits.
- It is now possible to ground an input to Models from 3.5 p10.
- A bug in line width for /STATISTICS output is fixed
- The Additional ATP card window (free format input) is wider and thus easier to edit.

- A bug related to Groups and gridsnap is fixed. All components was drawn in the neares 10 pixel position except for sub-circuits. This could result in a problem under Edit group if one of the component was moved.
- The problem with the decimal point '.' is probably fixed! ATPDraw forces internal usage of '.' regardless of the (Regional) settings in the Windows control panel (no news here). However, it was discovered that this internal setting was changes if another program directly changed the registry setting of the decimal point to ',' while ATPDraw was running. This is really bad programing practice, but unfortunately typical for Office products. When the registry setting changed ATPDraw automatically updated it's internal setting. When realizing this I found out that it was possible to turn this automatic update "feature" off in ATPDraw.
- A problem with $UNITS -1, -1 (reset of units) in BCTRAN output with AR option is fixed. ATP adds $UNITS -1, -1 at the end of the punch file always. This card is now removed by ATPDraw if no other $UNITS cards are found in the punch file (which is the case for AR output). This error was effective if Xopt and Copt had other values than zero, and in this case the single $UNITS -1,-1 card really reset Xopt and Copt to zero.

Updates in version 3.4 are:
- A bug related to back-to-back connected (via a connection) Splitters is fixed. The bug was probably introduced in v3.1 (where two other errors related to Splitters wher fixed).
- The User Specified library component lib.sup is available.
- The automatic error detection of the lis-file is optional (set under ATP|Settings/Output)
- The standard component library atpdraw.scl is updated so that the demo version of BCTRAN is available. External nonlinearities are not supported. The BCTRAN module is not fully debugged nor documented.

Updates in version 3.3 are:
- A bug is fixed in the module that translates punch files to library files for lines and cables and that resulted in some garbage at the end of the lib-file for 5-phase models.
- In version 3.0 the names of the components in the standard library were actually reserved names.
- After version 3.0 this is improved so that the user can create components (USP, MOD) with the same name as standard components.
- This change resulted in some intermediate problems with ATPDraw reporting support-file not found.
- In v3.3 the problems related to direct use of mod-files (an internal translation to sup-files) is fixed. The type 94 components are now again available.
- A demo version of BCTRAN support is included. External nonlinearities are not supported. The module is not debugged nor documented.

Updates in version 3.2 are:
- The nonlinear characteristic of all components can be plotted for visualization and copied to the windows clipboard.
- Also a more flexible handling of nonlinear characteristics that includes copying between components and pasting in from a text file (16 char. fixed columns used).
- Support of special editions of nonlinear inductors type 93, 96 and 96 with initial conditions and built-in flux-linked calculation.

Updates in ATPDraw 3.1 are:
- The Verify module in the Line/Cable dialog is extended to support calculation of steady state sequential impedances and line charging to enable easy comparison with benchmark data. The line model frequency scan is somewhat improved; the mutual impedance is calculated (6 phase line) and a bug related to the positive sequence is corrected (the sign of the angle is changed).
- Grouping is extended to allow nonlinear characteristics as external data.
- If external parameters in a group have the same name they are treated as a single parameter.
- 23 new components are added. Most are found under *TACS|Fortran|Logic/Math* and are special fixed Fortran statements. Others are found under *TACS|Transfer functions* and are single input derivative, integral and high/low pass filters. An inductor with a built in parallel timestep dependent resistor is found under *Branch linear/L||Rp*.

- An old bug related to transposition objects is fixed. Transpositions can now be inserted in the circuit in an arbitrary position along a radial. Two series transpositions need to be separated by a connection or component.
- An old bug related to splitters is also corrected. Two splitters can now be connected back-to-back (3 phase side) without any other connections at this point. Some bugs related to connections on a splitters single phase side is also corrected (this bug was apparently only present in version 3.0). It is still not possible to transpose a circuit or open one of the phases with splitters and connections only.
- A bug related to loading old circuit/project files is corrected.
- A bug in the "Save File" dialog's filters (only *.txt was available) is corrected.

Updates in ATPDraw 3.0 are:

- Grouping (single icon replacement, in multiple levels)
- Variables (support of $PARAMETER and POCKET CALCULATOR)
- Cable Constants (support of LINE/CABLE CONSTANTS and CABLE PARAMETERS)
- Rubber-band connections
- Insertion of free format text in predefined ATP-file locations
- All support files for standard components (167, incl. TACS) merged into ATPDraw.scl
- Creation of the ATP-file and execution of ATP replaced by one single command, run ATP (shortcut F2)
- The MOV 3-phase format bug corrected
- Errors in the general 3-phase transformer corrected (Dlead -> Dlag, Dlag corrected, D11 -> Y180)